DOCUMENT RESUME

ED 152 747 95 SP 012 519

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TITLE A Study of Teacher Planning: Description and a Model of Preactive Decision Making.
INSTITUTION Michigan State Univ., East Lansing. Div. of Educational Programs and Research.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Mar 78
CONTRACT 400-76-0073
NOTE 67p.; Paper presented at the Annual Meeting, American Educational Research Association (Toronto, Canada, March 27-31, 1978)

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS Affective Objectives; Classroom Environment; Classroom Research; Decision Making; Effective Teaching; Evaluative Thinking; *Instructional Design; Learning Activities; Lesson Plans; *Planning; *Problem Solving; *Teacher Behavior; Teacher Influence; Teaching Techniques; *Thought Processes

ABSTRACT

The primary objective of this study was to describe those mental processes involved in teacher planning decisions made prior to teaching. One elementary teacher's planning decisions were studied during five months of classroom instruction. Both ethnographic and information processing approaches were used to describe distinctive features of the teacher's planning "technology" and to develop two models of teacher planning. Two central aspects of the teacher's planning and instruction that emerged in this study were planning for instructional activities and the use of teaching routines. The structural model identifies five levels of planning used by this teacher: (1) yearly planning; (2) term planning; (3) unit planning; (4) weekly planning; and (5) daily planning. Goals, cues, form, and effectiveness criteria used at each level are described. The process model represents decision processes differing from the goals-alternatives-choice sequence of the linear planning model. Problem finding, problem formulation, and a design process involving cycles of plan elaboration and mental "trying out" are presented as major planning processes. (Author/JD)

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ED152747

Session 18.10

A Study of Teacher Planning: Description and A Model of Preactive Decision Making[1]

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1. Paper presented at the annual meeting of the American Educational Research Association, Toronto, Ontario, March 1978

2. This work was supported by the Institute for Research on Teaching at Michigan State University. The Institute for Research on Teaching is funded primarily by the Teaching Division of the National Institute of Education, United States Department of Health, Education and Welfare. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the National Institute of Education. (Contract No. 400-76-0073)

Printed in U.S.A.

SP012 519

A Study of Teacher Planning: Description and A Model of Preactive Decision Making

Much of the research on teaching in the last twenty years has involved the search for those teaching behaviors that are related to teaching effectiveness. The results of these efforts have been somewhat disappointing in that there have been few teaching behaviors that have been strongly and consistently related to student achievement or student attitudes. A general characteristic of most of these studies is their focus on teaching behavior that occurs when students are in the classroom. Jackson (1965) has referred to these face-to-face encounters between teacher and students as "interactive" teaching and has contrasted these behaviors with "preactive" teaching. Preactive teaching includes behavior that occurs before and after school, during recess, and at other times when the teacher is alone in the classroom. This behavior in the "empty classroom" may include such things as preparing lesson plans, marking papers, setting up equipment, making and running dittos, thinking about how to deal with certain behavior or learning problems, and so forth. Although this distinction between preactive and interactive teaching has been popular for many years, there have been few studies that have set out to examine the world of teaching when the students are absent.

Recently it has become popular to characterize teachers as problem solvers and decision makers (Shulman and Elstein, 1975, Lanier and Shulman, 1975). Many educational researchers have contended that the most important teaching skill is decision making (e.g., Shavelson, 1973), or have gone on

to assert "in teaching it's the thought that counts."[1] One consequence of this view is the temptation to portray the teacher as a rational information processor who is chiefly involved in making diagnoses, testing hypotheses, and making decisions all day long. It is much more likely that this conceptualization of teaching more accurately describes some moments of teaching than others. Although there may be some advantage to using logical and rational models to describe the teacher's in-class activities, opportunities for this type of behavior during interactive teaching may be few and far between . The rapidity and immediacy of the teacher's interaction with pupils in the classroom often precludes the rational-purposeful kind of thinking that is normally associated with problem solving and decision making.

To understand teaching as a purposeful, reflective activity, it is necessary to look in those places where this type of behavior is most likely to occur. The preactive phase of teaching is one place where the notion of the teacher as problem solver and decision maker may have the most descriptive power.

Of the many different things that teachers do in the preactive phase of teaching, one of the most important may be planning. It may be a rare teacher and classroom that would be able to function effectively without some kind of planning by the teacher. The wealth and variety of instructional materials available for teaching, the emphasis on meeting school or district objectives, and the wide range of student aptitudes in most classrooms are but a few of the demands on teachers that virtually necessitate thinking and planning for the term, coming weeks, or even the next day.

The importance of teacher planning has been further emphasized in recent ecological studies of the classroom (Kounin, 1970; Gump, 1969; Doyle, 1977 a,b). In a study of beginning teachers, Doyle (1977 a) found the most salient characteristics of the classroom environment for those teachers were: (1) multidimensionality, (2) simultaneity, and (3) unpredictability. By multidimensionality, Doyle means that classrooms serve a variety of purposes not all of which are compatible. Classrooms are simultaneous in that significant events often occur at the same time rather than following each other in serial fashion. Unpredictability refers to the degree to which the complexity of ebb and flow in classroom events prevents the teacher from accurately predicting the outcome of a planned activity. By adding to these characteristics those of urgency and spontaneity or, as Jackson (1968) refers to it, the "immediacy" of the classroom, one arrives at a picture of the teaching environment dominated by two features: complexity and unpredictability.

In addition to characterizing the environment in which teachers are required to operate, ecological psychology acknowledges and emphasizes the subtle yet complex interdependencies between behavior and environment. As a way of looking at classrooms, ecological studies are based on the premise that the environmental demands of the classroom both shape observed behavior and establish limits to the range of response options available to the actors (Doyle, 1977 b). In other words, "settings have plans for their inhabitants' behavior, and inputs are achieved within the limits of the settings' control system to produce the planned behavior" (Barker, 1963). What this means for teachers is that not only is the classroom environment complex and unpredictable, but teaching behavior in the classroom may be to a large degree "controlled" or "planned" by the environment

itself.

If it is true that teaching behavior in the classroom is, to a large degree, a function of the features of the environment, then it becomes an important question to ask how the teacher can influence the environment so that behavior within the interactive setting conforms as closely as possible to the teacher's goals. It may be that teacher planning becomes the major tool by which teachers manipulate teaching environments to shape and control settings that may later shape and control their own behavior.

Until recently, the literature on planning in education and in other fields has been dominated by theoretical and prescriptive dicta. Education has adopted for the most part a rational model of planning based on planning models from economics and from national and city planning theory. This model, which will be referred to as the Rational Choice Model, in essence requires:

1. The setting of goals
2. the formulation of alternatives
3. the prediction of outcomes for each alternative, and
4. the evaluation of each alternative in relation to the goals and outcomes.

In educational planning this approach to decision making has been most popularly advocated in a model of curriculum planning first proposed by Tyler (1950) and later elaborated by Taba (1962) and Popham (Popham and Baker, 1970). This model recommends four essential steps for effective planning:

1. Specify objectives
2. Select learning activities

3. Organize learning activities

4. Specify evaluation procedures

This model is basically a rational means-ends model in which a planner's first task is to decide on the desired ends, or what is to be accomplished, and then select the appropriate learning activities to accomplish them. Curriculum planning is thus characterized as a task that requires orderly and careful thinking and this model is proposed as a rational and scientific method for accomplishing this task. Because of this rational and scientific appeal, this model has been prescribed for all types of educational planning - ranging from the most comprehensive curriculum planning to the classroom teacher's daily lesson planning.

The only departure from this rational model of teacher planning that has been advocated is the "integrated ends-means model" (Zahorik, 1975) suggested by MacDonald (MacDonald, 1965; MacDonald, Wolfson, & Zaret, 1973) and Eisner (1967). They propose that teachers do not begin their planning by thinking about objectives and then proceeding to decisions about activities, evaluation, and so forth; rather, teachers first focus on the type of learning activity that will be provided for the students. They argue that objectives arise and exist only in the context of an activity, as a result of students choosing their own learning experiences and pursuing their own objectives. Thus, in this model, ends for learning become integrated with means for learning and the specification of goals prior to an activity becomes meaningless.

Though researchers such as Philip Jackson have long pointed to the importance of looking at teacher behavior in the preactive setting (Jackson, 1965) relatively few studies have ventured into this domain. Empirical

studies of teacher planning have only been conducted since 1970, and to date, the published studies can still be counted on one hand.

Zahorik (1970) did the first empirical study of classroom behavior. He provided six of his sample of twelve teachers with a partial lesson plan containing behavioral objectives and a detailed outline of content to be covered two weeks hence. He requested the remaining six teachers to reserve an hour of instructional time to carry out a task for the researchers, not telling them that they were going to be asked to teach a lesson on credit cards until just before the appointed time. Zahorik analyzed recorded protocols of the twelve lessons focusing on "teacher behavior that is sensitive to students." He defined this behavior as "verbal acts of the teacher that permit, encourage, and develop pupil's ideas, thoughts, and actions." Upon examining the protocols of the planners and non-planners, Zahorik noted that teachers who planned exhibited less honest or authentic use of the pupil's ideas during the lesson. He concluded from this that the typical planning model - goals, activities, and their organization, and evaluation - result in insensitivity to pupils on the part of the teacher.

Taylor (1970) conducted a study of teacher planning in British secondary schools. By means of group discussion with teachers, analyses of course syllabi, and the administration of a questionnaire to 261 teachers of English, science, and geography, Taylor came to the following general conclusions. The most common theme found across all of the modes of data collection was the prominence of the pupil, especially his needs, abilities, and interests. Following this, in order of importance, were the subject matter, aims (goals, and teaching methods.) In planning for

courses of study, evaluation emerged as being of little importance as did the relation between one's own course and the curriculum as a whole.

Through teacher ratings of the importance of various issues in curriculum planning and a factor analysis of their responses, Taylor identified four primary factors of interest to his sample of teachers. The results generally indicated that when planning, the teachers tended to consider in order of importance: 1) factors associated with the teaching context (e.g. materials and resources), 2) pupil interest, 3) aims and purposes of teaching, and 4) evaluation considerations. Rather than beginning with purposes and objectives and moving to a description of learning experiences necessary to achieve the objectives as the rational planning theorists propose, Taylor found that these teachers began with the context of teaching, next considered learning situations likely to interest and involve their pupils, and only after this considered the purposes their teaching would serve. Also, unlike the theorists, criteria and procedures for evaluating the effectiveness of their course of teaching was an issue of only minor importance.

Zahorik (1975) continued this line of inquiry by examining the use of behavioral objectives and the "separate ends-means" model of planning as well as the use of the "integrated ends-means" model proposed by MacDonald and Eisner. He asked 194 teachers to list in writing the decisions that they make prior to teaching and the order in which they make them. He classified these decisions into the following categories: objectives, content, activities, materials, diagnosis, evaluation, instruction, and organization. He found that the kind of decision used by the greatest number of teachers concerned pupil activities (indicated by 81% of the teachers). The decision most frequently made first was content

(51%) followed at a distant second by behavioral objectives (28%).

Zahorik concluded from this study that teacher planning decisions do not always follow logically from a specification of objectives and that, in fact, objectives are not a particularly important planning decision in terms of quantity of use. He also argued, however, that the integrated ends-means model does not appear to be a functioning reality because of the relatively few teachers (only 3%) who began their planning by making decisions about activities.

Only recently has research on teacher planning begun focusing on describing teacher decision making in actual planning situations. Peterson, Marx, and Clark (1977) examined planning in a laboratory situation as twelve teachers prepared to teach a new instructional unit to groups of junior high school students with whom they had had no previous contact. These units were taught to three different groups of eight students on three different days. During their planning periods, teachers were instructed to "think aloud", and their verbal statements were later coded into planning categories such as objectives, materials, subject matter, and process. The following results were obtained from this study: 1) teachers spent the largest proportion of their planning time dealing with the content (subject matter) to be taught, 2) after subject matter, teachers concentrated their planning efforts on instructional processes (strategies and activities), and 3) the smallest proportion of their planning time was spent on objectives. All three of these findings were consistent with those by Zahorik (1975) and by Goodlad, Klein, and others (1974). The third finding was also similar to results reported by Joyce and Harootunian (1964) and by Popham and Baker (1970).

A study by Morine (1976) in a semi-controlled classroom setting found results consistent with those of Peterson, Marx, and Clark. Morine collected written plans for two experimenter prescribed lessons (one in mathematics and one in reading) taught by the teachers in their own classrooms to a subset of her students. Teacher plans were analyzed according to 1) specificity of written plans, 2) general format of plans, 3) statement of goals, 4) source of goal statements, 5) attention to pupil background and preparation, 6) identification of evaluation procedures, and 7) indication of possible alternative procedures. Morine found that teachers tended to be fairly specific and use an outline form in their plans yet paid little attention to behavioral goals, diagnosis of student needs, evaluation procedures, and alternative courses of action.

The present study of teacher planning was undertaken to investigate three questions about teacher planning not addressed by previous research:

1. What does teacher planning look like as it occurs naturally in classroom over long periods of time?
2. What types of problem solving and decision making processes are involved in teacher planning?
3. What models of the planning process can be developed from actual planning behavior in a naturalistic setting?

Method

The primary objective of this study was to describe those mental processes involved in teacher planning decisions made prior to teaching. This objective was addressed within the context of a case study focusing on a detailed examination and description of one elementary teacher's planning decisions during a five month period of instruction. The study was designed to address a need for descriptions and theoretical

models of planning processes and to examine the usefulness of certain decision modeling methods for describing complex decisions as they occur in field settings. The method chosen involved a mixture of the participant observer strategy common to ethnographic studies in sociology and anthropology and the process tracing strategy shown to be effective in studies of problem solving and decision making in laboratory and restricted field settings.[2]

The teacher chosen for this study was teaching in a combined first and second grade classroom in a local school district. This was her sixth year of teaching, three years of which had been spent in a special education classroom and three years in a first and second grade "split" classroom. She was regarded as a very organized and creative teacher who spent much time in planning activities and was highly respected by her colleagues. She was in her early thirties and had earned a bachelor's degree in social work and a master's degree in special education prior to teaching.

Two major phases of data collection were involved in this study. In the first twelve weeks of the study, approximately forty full school days were spent observing and recording the teacher's activities in both the preactive and interactive phases of teaching. Ethnographic descriptions of teaching were collected as the investigator functioned as a "participant observer" in the classroom. The observer's role most frequently took the form of sitting quietly at a spot in the classroom offering full view of all activities, taking written notes and recording as much of the action of the classroom (focusing on the teacher) as possible. At times when the students were not in the classroom, the

investigator "shadowed" the teacher, following her throughout the day and recording her behaviors and statements. During these times, the teacher was engaged in an on-going "thinking aloud" process where she attempted to verbalize her thoughts regarding the activities in which she was involved. Notes were kept throughout this process and questions were often asked to clarify or elaborate her statements. During more deliberative instructional planning sessions, the teacher's thinking aloud was also tape recorded. By using these approaches, a detailed written description of the teacher's behavior was obtained, portraying planning decisions within the context of days, weeks, and months of teaching.

The second phase of the data collection further investigated the teacher's planning by observing her behavior in the Teacher Planning Shell (a simulation task developed for this study) and in three judgment tasks examining the teacher's perceptions of her students and instructional activities. Additional classroom observations and interviews were also conducted during this phase.

Basically, two types of data were generated and analyzed in this study. During the first three months, detailed field notes were made of the pre-active and interactive teaching activities occuring on the observation days. In addition, detailed notes or audio recordings were made during the teacher's planning and during her participation in the Teacher Planning Shell and the judgment tasks.

The field notes were constructed with the purpose of providing a running account of the teacher's behavior. As incidents occurred, as many features of the behavior and situation were recorded as possible. Attempts were made to record what was said, who said it, the nature and

location of the activity, the participants, the noise level, tone of voice, posture, facial expression, and so forth. The strategy used to sort out complex situations was to focus on the teacher's behavior, only recording students' behavior as they interacted with her.

The analysis of the field notes proceeded in the following manner. At the end of each observation day, the field notes were recorded onto cassette tapes to be later transcribed. Putting the field notes into this form served as a review of the day's activities and provided a further stimulus to thinking about the teacher's planning in relation to classroom activities. When in typed form, the field notes were reread with the purpose of looking for broad patterns of behavior in the interactive setting that seemed related to planning decisions. As the study progressed, the field notes became the background for interpreting planning behavior, since they illustrated the various factors that seemed to be influencing the planning of classroom activities as well as shedding light on the factors that effected the implementation of the activities.

The notes and tape recordings of the planning sessions were analyzed in a manner similar to that used with the field notes. Because of the difficulty of transcribing the audio tapes, they were analyzed by repeatedly listening to the decision protocols and summarizing their content, making special note of decision components and processes. The variety and complexity of the different planning situations precluded an analysis of the protocols at a level similar to those used in previous process tracing analyses, but a model of the planning process was constructed that reflected the process at a more meaningful level.

The data analysis and model development proceeded by alternation between data collection and conceptualization. The general procedure followed the steps in qualitative analysis initially advocated by

Becker (1958) and also used by Smith and Geoffrey (1968). They include:

1. Selection and definition of problems, concepts, and indices.
2. Analyzing the frequency and distribution of phenomena.
3. Construction of models.
4. Final analysis and presentation of results

Time became an important tool in the analysis. Concepts, methods, and processes gradually surfaced in the data as a result of spending extended amounts of time observing and describing the teacher's decision behavior. As process elements became apparent, they were formulated into working hypotheses to be examined in future situations as well as in previous field notes. As models were further developed, they were discussed with colleagues, many of whom were or had been classroom teachers. Thus, over time, concepts were defined and tested against classroom observations, and descriptive and theoretical models of teacher planning gradually took form.

Results

Activities and Routines: The Teacher's Planning Technology

Two central aspects of the teacher's planning and instruction that emerged in this study were planning for instructional activities and the use of teaching routines. Activities were described as the basic structural units of planning and action in the classroom. Nearly all action and interaction in the classroom took place within the boundaries of an activity, and, for the most part, the remaining time was used for preparation for or transition between activities.

Activities also played an important role in the teacher's planning decisions. Daily planning, weekly planning, and unit planning all largely

involved the organizing and sequencing of activities. For example, when the teacher planned units for science or social studies, the first step in her planning was to gather all the materials she could find on the topics, look through the materials, and then list activities that might be carried out as part of the unit. These activities were either based on the materials themselves or on ideas developed from the materials. Once a general sequence for the unit had been decided, further planning largely involved the selection and sequencing of activities.

One functional role that activities played in the teacher's planning and instruction was as "controlled behavior settings". Behavior settings are ecological units of behavior described by ecological psychologists (see for example, Barker, 1963 and Doyle, 1977 b). Kounin (Institute for Research on Teaching, in press) states that behavior settings have four distinct features: (1) definite temporal and spatial boundaries, (2) a physical milieu with props (books, pencils, and so forth), (3) a standing pattern of behavior, and (4) interaction between the physical components and the standing pattern of behavior.

Activities, as defined in this study, were equivalent to behavior settings, although they may be more accurately described as controlled behavior settings. Not only was the behavior of the teacher signalled and controlled by the setting as the ecological psychologists suggest, but the setting itself was largely created and controlled by the teacher ahead of time. Through planning, the teacher was able to structure activities to increase the probability of signalling and eliciting behavior that conformed to her purposes. Therefore, even if the teacher's behavior in the activity was largely a reaction to the pupil's actions in

the setting, general boundaries and guidelines were already established for behavior through preactive planning.

In the course of the study, seven features were identified that characterized instructional activities in this teacher's classroom. These features were basically an elaboration of Barker's and Kounin's features of behavior settings expanded to include components especially salient in instructional settings. These features are:

1. Location
2. Structure and Sequence
3. Duration
4. Participants
5. Acceptable Student Behavior
6. Instructional Moves
7. Content and Materials

For each instructional activity in the teacher's classroom, planning decisions were made about these features. In some activities, these decisions were made quite often, but in most, decisions were only made once or twice and the activity became fixed or routinized.

In the above list, location refers to the physical location of an activity. The activity might take place for instance, on the rug in the corner of the room, at the students' seats, at one of the work tables, or in another location in the building. Structure and sequence refers to the phases and components of action involved in an activity. The general structure and sequence of an activity in this teacher's classroom included three major components: Set-up (includir such things as passing out

materials, directing students to certain locations in the room, rearranging desks, pulling down shades or projection screens, etc.), Lesson (whole class, group, or individual work involving such things as reading, reciting, discussing or writing), and Take-down (e.g., returning to one's seat, collecting materials, cleaning-up). The duration of an activity simply pertains to the length of time an activity lasts. Participants in an activity are determined largely by decisions about grouping. The teacher in this study conducted most of her activities with the whole class or with small groups. Acceptable student behavior refers to the specification of appropriate and permissable student action in an activity. This teacher, for instance, differed across activities in relation to the amount of student talk, general noise level, and student ability that was accepted. Instructional moves make up the other major interactional component of activities and refers to teacher instructional behaviors such as giving instructions, questioning, presenting information, monitoring, evaluation, and feedback. A classification of this teacher's instructional moves using Gump's (1967) teacher-role categories indicated that this teacher more often took a more student-centered role as a "watcher-helper" or "action-director" than a more teacher-centered role such as a "recitation leader" or "instructor-demonstrator". Content and materials of an activity refer to the specific "what" and "by what means" of an activity. Decisions about content and materials were the most frequent activity-related decision made by this teacher in her planning.

A second distinctive feature of this teacher's planning "technology" that emerged in this study was the use of routines. Routines were a mechanism used to establish and regulate instructional activities and to simplify the planning process. Routines also served to increase the

predictability and to reduce the complexity of the teaching environment. Routines played such a major role in the teacher's planning behavior that her planning could be characterized as decision making about the selection, organization, and sequencing of routines.

Four types of routine were identified in this study: activity routines, instructional routines, management routines, and executive planning routines. Activity routines functioned to control and coordinate the features of instructional activities. The large number of activities in this teacher's classroom were managed by routinizing as many of the activity components as possible. By the middle of the school year, for example, only fourteen percent of the instructional activities were not routinized (when routinization is defined as having 4 or more of the activity features mentioned above set or established prior to weekly planning).

Instructional routines refer to methods and procedures established by the teacher to carry out specific instructional moves. These routines were in effect strategies or styles of teaching that were developed over time and occurred in established configurations and sequences. Instructional routines were used by the teacher in this study for questioning, monitoring, giving instructions, etc.

Management routines are established procedures for controlling and coordinating classroom organization and behavior not specifically associated with an activity. In this teacher's classroom, management routines regulated such things as transition between activities, passing out or collecting materials, leaving the room, cleaning up the room, and starting school in the morning or after lunch.

Executive planning routines refer to a system of established thought patterns set off by specific planning tasks and resulting from experience in numerous similar situations. These routines activate and guide planning processes in the same way that cognitive strategies activate and guide learning in models of learning (e.g., Gagné, 1970). These routines were manifest in this teacher's planning through established planning patterns for daily, weekly, and unit planning.

Routines were seen to function during this study in two major ways. First, routines increased the teacher's flexibility and effectiveness by freeing time and energy from many planning and implementation decisions. The routinization of action fixed certain aspects of behavior and thus reduced the number of characteristics of an instructional situation that must be evaluated, decided upon, and manipulated. Second, routines increased the predictability and reduced the complexity of the classroom environment for the students. This allowed the students to better predict the direction in which an activity was going and what would be expected of them as participants. The result of this was that more time was spent on content and less time spent on procedure.

A Structural Model of the Teacher's Planning

Five basic types of planning activity were identified in this teacher's instruction. Because of their hierarchical organization and focus on different spans of classroom activity, they are referred to as levels of planning. The five planning levels portrayed in the model are: (1) yearly planning, (2) term planning, (3) unit planning, (4) weekly planning, and (5) daily planning. Although planning may occur in the interactive teaching setting, it was not a focus of this study and is not a part of the model. Figure 1 illustrates the five basic levels of the

model plus two other levels -- institutional planning and planning for next year -- which interact with preactive planning. Yearly planning is concerned with general materials, pupil placement, and sequencing and organizing teaching for the whole school year. Term planning centers on activities that will occur within the twelve weeks before the next break. Unit planning refers to the planning involved in developing an instructional unit for a specific subject matter. This unit will take place over a period of several weeks within a term. Weekly planning focuses on activity that will occur as part of the schedule on Monday through Friday, while daily planning involves the last minute modifications or preparations to be made during the day or before school starts the next day.

Four of the five levels of planning in this model were directly observed in this study. Since this research was conducted during the winter and spring terms, there was no opportunity to observe planning at the beginning of the school year. Information on this type of planning was obtained through interviews and through recall stimulated by using the teacher's plan book to re-create her planning before school started and at the beginning of the year. The basic structure of the model was developed through observation and interviews during the study. This was further corroborated by the teacher's description of her own planning.

To describe and differentiate planning at each of the five levels in the model, four dimensions of the planning process were described. These included (1) planning goals, (2) information sources, (3) form of the plan, and (4) criteria for judging planning effectiveness.

The description of these four aspects of the teacher's planning at each level was based on several data sources. For the most part, the

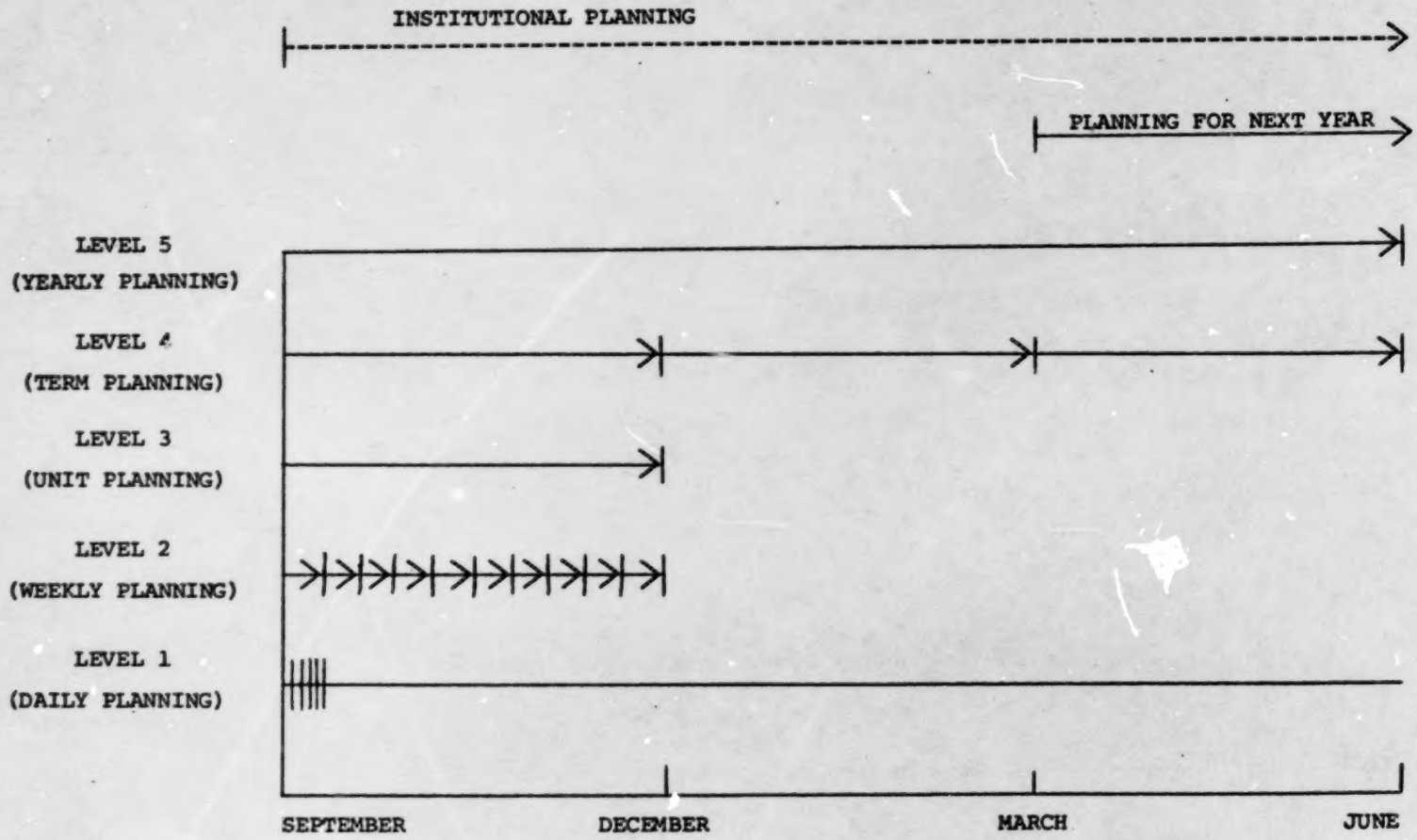

Figure 1 A structural model of preactive planning.

teacher's planning goals were obtained through discussion and interview and through observation of her on-going planning. Information about the sources of information used in her planning were obtained through observation and through the pupil and activity judgment tasks mentioned above. The form of the teacher's plans were observed during the study, and the description of her criteria for judging planning effectiveness was based on observation and interview as well as on the analysis of past plans. Table 1 provides a summary of the characteristics of each of the four dimensions for each level of planning.

An important question to ask about a structural model such as this is how are the different levels connected and under what circumstances do they interact? Six planning times were identified that involved the most visible interaction among the different levels of this teacher's planning. They were: (1) the beginning of the year, (2) the beginning of the term, (3) the third week in the term, (4) the beginning of unit planning, (5) when the weekly schedules are planned, and (6) at the end of the school day. These connections are illustrated for fall term in Figure 2.

The beginning of the year provided opportunity for interaction among several levels. As the teacher got to know the students better in the first few weeks of school, her yearly planning was elaborated and modified. As this was taking place, fall term planning was also being laid out and a weekly schedule was developed. This planning did not react significantly with daily and weekly planning until the third or fourth week since the activities of the first few weeks more fairly standard orientation and diagnostic activities that the teacher always uses in the first few weeks of school.

Table 1: Planning at each level of the model

	Planning Goals	Information Sources	Form of the Plan	Criteria for Judging Planning Effectiveness
Yearly Planning	1. To establish general content (fairly general and framed by district curriculum objectives) 2. Establishing basic curriculum sequence 3. Ordering and reserving materials	1. Students (genral info about numbers and returning students) 2. Resource availability 3. Curriculum guidelines (district objectives) 4. experience with specific curricula and materials	General outlines listing basic content and possible ideas in each subject matter area. (spiral notebook used for each subject)	1. Comprehensiveness of plans. 2. Fit with own goals and district objectives
Term Planning	1. Detailing of content to be covered in next three months. 2. establishing a weekly schedule for term that conforms to her goals and emphases for the term	1. Direct content with students 2. Time constrainst set by school schedule 3. Availability of aides	1. Elaboration of outlines constructed for yearly planning 2. A weekly schedule outline specifying activities and times	1. outlines - comprehensiveness, completeness and specificity of elaborations 2. Schedule - comprehensiveness fit with goals for term balance 3. fit with goals for term
Unit Planning	1. Developing a sequence of well organized learning experiences 2. Present comprehensive, integrated and meaningful content at an appropriate level	1. Student abilities, interests, etc. 2. materials-length of lessons, set-up time, demand, format 3. District objectives 4. Facilities available for activities	1. Activity and content lists or outlines 2. sequenced activity lists 3. notes in plan book	1. organization,sequence balance, and flow of outlines 2. fit with yearly & term goals 3. Fit with anticipated student interest and involvement
Weekly Planning	1. To lay out the week's activities within the framework of the weekly schedule. 2. Adjusting schedule for interuptions & special needs 3. Maintain continuity & regularity of activities	1. Student performance in preceeding days and weeks 2. Scheduled school interruptions (e.g., assemblies holidays) 3. Continued availability of materials, aides, and other resources	1. Activity names and times entered into a plan book 2. Day divided into four instructional blocks punctuated by a.m. recess, lunch, and p.m. recess.	1. Completeness of plans 2. Degree to which weekly schedule has been followed. 3. Flexibility fo plans to provide for special time constraints or interruptions 4. Fit with goals
Daily Planning	1. Set-up and arrange classroom for next day 2. Specify activity components not yet decided upon 3. Fit daily schedule to last minute intrusions 4. To prepare students for days activities	1. Clarity of instructions in materials to be used 2. Set-up time for activities 3. Assessment of class "disposition" at start of day 4. Continued interest,involvement & enthusiasm	1. Schedule for day written on the chaulkboard& discussed with students 2. preparation and arrangement of materials and facilities in the room.	1. Completion of last minute preparations and decisions about content, materials, etc. 2. Involvement, enthusiasm, & interest communicated by students

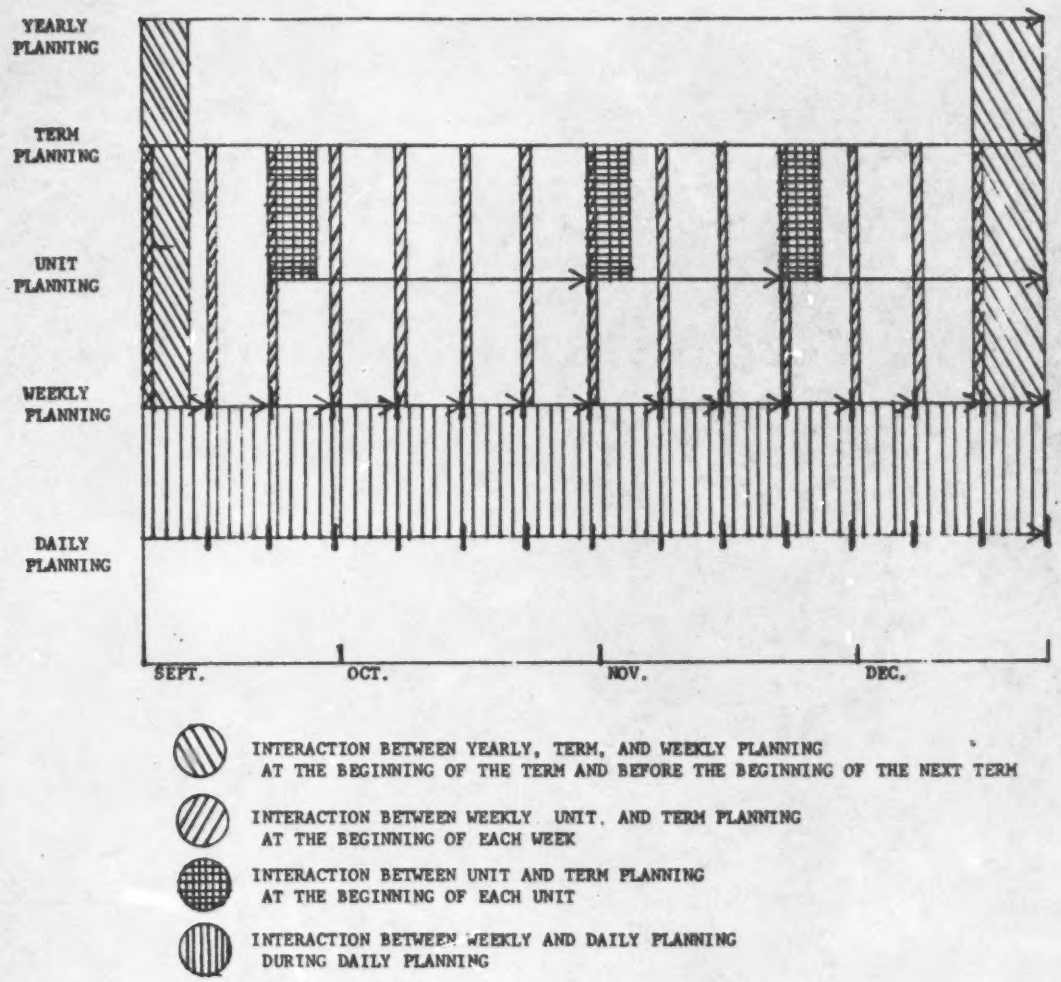
YEARLY PLANNING
TERM PLANNING
UNIT PLANNING
WEEKLY PLANNING
DAILY PLANNING
SEPT.
OCT.
NOV.
DEC.
INTERACTION BETWEEN YEARLY, TERM, AND WEEKLY PLANNING AT THE BEGINNING OF THE TERM AND BEFORE THE BEGINNING OF THE NEXT TERM
INTERACTION BETWEEN WEEKLY UNIT, AND TERM PLANNING AT THE BEGINNING OF EACH WEEK
INTERACTION BETWEEN UNIT AND TERM PLANNING AT THE BEGINNING OF EACH UNIT
INTERACTION BETWEEN WEEKLY AND DAILY PLANNING DURING DAILY PLANNING

Figure 2 Interaction between levels of planning (illustrated for fall term).

At the beginning of the term, interaction between yearly and term planning was most visible. As the next term was laid out, yearly plans were consulted for general sequence and content. Since the weekly schedule for the term was only tentatively arranged at the beginning of the term, the third week in the term provided interaction among daily, weekly, and term planning. At this time, the schedule was sometimes modified since the teacher felt the students had had enough time to adjust to it; thus problems in the schedule were not merely related to student adjustment. Modifications were based on actual classroom outcomes and on problems the teacher encountered in her weekly or daily planning.

When unit planning was beginning, interaction often occurred with term planning. The planned length of the unit and the number of periods set aside during a week influenced the scope and length of the unit. Unit planning also interacted with weekly planning as the unit activities were fit into the weekly schedule. Weekly planning also required connections with term planning as the teacher integrated the week's activities with her goals and priorities for the term.

At the end of the school day, when most daily planning occurred, one interaction between daily and weekly planning was most commonly observed. Daily planning was usually a function of what had been specified for the week. It was also possible that the plans for later in the week might be modified as a result of the day's activities.

Each of these six times that have been briefly characterized may be thought of as potential research sites at which to examine teacher planning in more detail. It is at these times that planning was most explicit since several planning levels were interacting. Although it would be unreasonable

to assume that other teachers plan in identical ways, these times when this teacher's planning was most active and visible might serve as guides to strategic research sites in other teachers' planning.

A Process Model of Teacher Planning

In addition to the description of one teacher's planning, it was a goal of this study to formulate a general model of the teacher planning process. The model has two major purposes: (1) to describe and represent in a schematic form speculations about the components of teacher planning and their interrelationships, and (2) to serve as a basis for further theory and research on teacher planning.

The process model is grounded on three data bases. The first is the data collected in the field research portion of the study. By the end of the field research, many things were known about this teacher's planning. It was known that most of her planning focused on instructional activities. Many of these activities were well routinized, and by winter term planning time was take up primarily by planning for social studies and science units. The teacher's planning could be described at five levels and each level could be distinguished in terms of goals, information used, the form of the plan, and the criteria for judging planning effectiveness. Also, choice (the selection among alternatives) was not a prominent activity in her planning. Rather, it was characterized by the development and elaboration of activities over time. Furthermore, this elaboration took place as activities passed from general to more specific levels of planning. Also prominent in this teacher's planning was her reliance on past experience -- what seemed to work well or didn't work with previous classes.

The second source of data for this model comes from other studies of teacher planning. Two findings of special interest to this model are the failure to identify objectives as a primary object of teacher decision making during the planning process (Zahorik, 1975; Peterson, Marx, and Clark, 1977) and the lack of well developed alternatives in teachers' plans (Morine, 1976). Both of these findings support the notion that teacher planning in practice is not characterized by processes advocated by the rational choice model. Rather than being dominated by decisions about objectives and alternatives, these studies indicated a greater concern for content and activities.

The third source of data is psychological studies of problem solving and planning conducted in deliberative situations in mathematical problem solving (Selz, 1922, 1924), chess playing (deGroot, 1965), musical composition (Bahle, 1930, 1936), art (Getzels and Csickszentmihali, 1976), and architectural design (Eastman, 1970 a, 1970 b; Baer, 1976). The basis for the utilization of this data as a source for the model is "theory translation" (Snow, 1973). Theory translation is the process of borrowing or substituting a theory or part of a theory based on analogies between two situations. The similarities among the situation in teacher planning and those of selecting a move in chess, composing a musical or visual composition, or planning for space utilization in a building suggested the usefulness of adopting concepts from research on these thinking processes.

The focus of the model is on the individual, preactive, deliberative information processing involved in planning from an initial idea to its implementation. Planning in the preactive stage of teaching was chosen since it is the site of most instructional planning. The focus of the model is on the processes of planning in order to shed light on possible

methods used by teachers in their planning. The lack of knowledge about mental processes involved in actual planning (discussed above) makes the need for such a description apparent. The model deviates from traditional models of planning primarily in that the emphasis is on the discovery and design processes in planning rather than on the choice processes. In short, the model portrays planning as "purposeful problem solving" as opposed to "rational choice."

The general process model of teacher planning is illustrated in Figure 3. The model contains three stages:

Stage I - Problem Finding

Stage II - Problem Formulation/Solution Design)

Stage III - Implementation, Evaluation, and Routinization

Stage I is the first step in planning. It is here that the general planning task is translated into a specific planning problem. The major process at work in this stage is a discovery process through which problem finding occurs. This primarily involves interactions among the planning dilemma, teaching goal conceptions, knowledge and experience, and materials. The product of this stage is an "initial problem conception" to be further elaborated in the problem formulation/solving stage.

Stage II is where most of the planning energy and time is invested. The primary process of interest in this stage is the "design cycle." It is through this cycle that the initial activity idea is repeatedly elaborated and tested until a satisfactory solution is found.

Stage III is where the activity is actually implemented and evaluated in the classroom. This stage provides the teacher with information on the workability of the activity with one's group of children and may lead to further modification or even rejection of the activity. If an activity is successful, it may eventually be routinized. Experience with both successful and unsuccessful activities and routines eventually is fed back to long-term memory where it becomes part of the repertoire of knowledge and experience used in future planning.

These three stages of planning characterize the teacher planning process "from idea to implementation." Each stage will be described in more detail below.

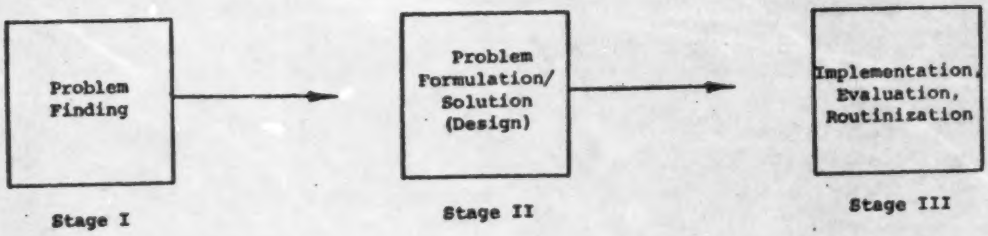

Figure 3: Stages of the Planning Process

Problem Finding

In this model, problem finding refers to the process of becoming aware of what specific problem needs to be solved within a general, non-specified problem situation. In the context of teacher planning, problem finding refers to the "discovery" of a potential instructional idea that requires further planning and deliberation. This idea is referred to as a "problem" since at this stage in planning it is still not known if this idea can be realized in the classroom and, if so, how it will be done. Since the instruction of the teacher in this study centered on activities, the "problems" that surfaced in her problem finding were usually ideas for activities. Other "problems" that might be dealt with during this stage include plans themselves (e.g., weekly plans) or specific lessons.

Figure 4 illustrates in more detail the processes involved in problem finding. Problem finding is portrayed as involving interaction among the planning dilemma confronting the teacher (arising from the general teaching dilemma), teaching knowledge and experience, teaching goals, and the teaching materials available. The sensing, searching, generating, and manipulating of ideas based on these elements is referred to as the discovery cycle. The result of this cycle is a statement of a problem (idea) in the form of an "initial problem conception" which becomes the basis for further elaboration (planning).

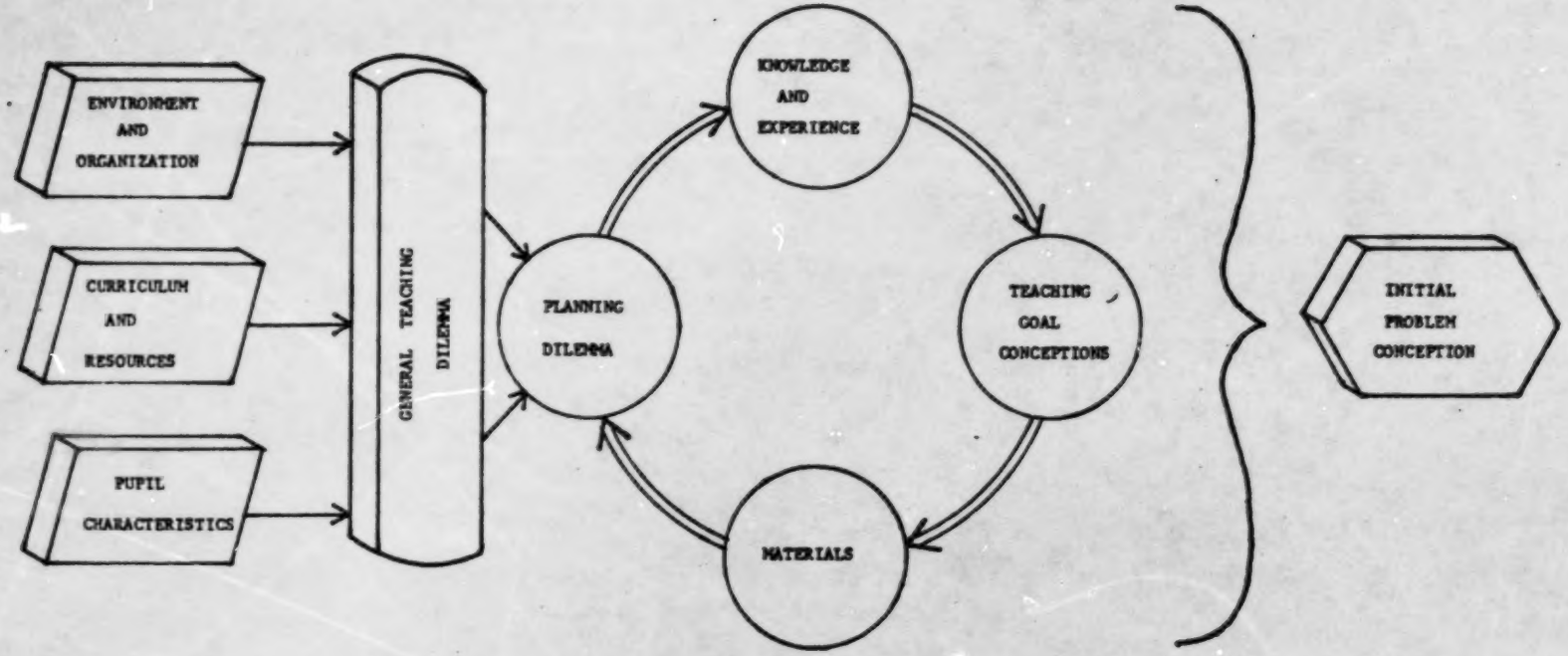

Figure 4: The problem finding stage of teacher planning.

The general task for teaching is represented in the model by the "general teaching dilemma." One way of stating this dilemma is, "Here is your classroom; here are your students; teach them." Although this is obviously an oversimplification, it may be closer than one thinks to characterizing the "openness" in many teaching and planning situations.

Three major influences contributing to the general teaching dilemma are portrayed in the model. The first is the teaching environment and its organizational influences. This includes such things as the physical characteristics of the classroom and the school, organizational factors (e.g., classroom organization, number of students in the class, length of the school day) and relationships with the principal and with other teachers. The second major influence on the general teaching dilemma is the curriculum and resources available for teaching. This involves the curricular guidelines inherent in school or district objectives and in student evaluation forms, programs, kits, and materials supplied to the school for teaching certain subjects, resource teachers available for teaching in certain subject matter areas (e.g., art or music), and aides available for helping in the classroom. Pupil characteristics are the third major influence shaping the general teaching dilemma. Influential characteristics include pupil background factors and judgments of student ability, maturity, attention span, ability to work as a group, and so forth.

The fact that teachers vary in the materials and activities they use in their classrooms even at similar grade levels in the same school raises the question of where ideas and activities come from. If they arise solely from the general teaching dilemma confronting them, it would seem likely that teachers in similar situations would be teaching in similar ways.

The discovery cycle is a means for accounting for the uniqueness and originality of teaching. It does this by including in problem finding four other components: the "planning dilemma," teaching knowledge and experience, "goal conceptions" of teaching, and teaching materials. The planning dilemma is created as a direct outgrowth of the general teaching dilemma. As soon as one begins to explore the general teaching dilemma, one finds that it is characterized by complexity, immediacy, and unpredictability. These factors make planning a near necessity, and it is out of this need that the planning dilemma is formulated. The planning dilemma might be stated in its most general form as, "I've got to plan for this unit (or activity, lesson, etc.)." The specificity of the planning dilemma may change as planning proceeds over time. In this manner, the planning dilemma frames the problem finding process at various levels of specificity. This might be described in information processing terms as a way of establishing the "problem space" for problem finding.

Teaching goal conceptions are one of the two goal components in this planning model. The other is the total problem conception that is part of the design cycle in the problem formulation/solution stage. Both of these terms are modeled after deGroot's (1965) notion of "Total Goal Conception," which refers to a problem solver's anticipatory conception of the solution to the problem, or the "goal-as-attained." It includes all features of the goal and the problem which are important to the problem solver at a given point in the thought process. Total goal conception was chosen as a model for the goal components in this model because (1) the schematic, incomplete character of the total goal conception that is gradually modified and elaborated during problem solving process seemed to

accurately capture the orientation towards goals and objectives of the teacher in this and previous studies of planning; (2) it is comprehensive enough to include cognitive and affective expectancies for solving a problem, and (3) it incorporates a dynamic motivational element into the model in terms of expectancies and anticipations to realize the total goal. Teaching goal conceptions in this model refer to anticipatory conceptions of what effective teaching would look like for a specific group of students. This includes conscious, explicitly stated goals and objectives (both cognitive and affective). It also refers to vague intuitions, disposition, or attitudes toward teaching that one may possess.

Knowledge and experience are portrayed in this model as involving: (1) learned and specific ways of perceiving a problem situation, and (2) a system of reproductively available knowledge and methods in memory. In problem finding, knowledge and experience provide a repertoire of ideas (problems) that may serve as a basis for initial problem conception, influence the direction of the problem finding process by means of executive planning routines, and provide a further screen to potential ideas by comparing them with the success or failure of similar ideas in the past.

The fourth major component of the discovery cycle is materials. This component includes not only the teaching materials provided by the school or district, but also any potential source of teaching ideas available to the planner. The sole function of materials in the discovery cycle is as a resource for problem conceptualization. In the same way knowledge and experience served as an internal storehouse or repertoire of ideas, materials serve as the external source.

The product of problem finding is the initial problem conception. This refers to the abstract, schematic idea (conception) seen as a worthy prospect for further elaboration. The only general constraints put on this idea are that it contributes to the completion (fulfillment) of the teaching goal conceptions and that it has not been tried and rejected in the present planning situation. In other words, it must be perceived as a worthy instructional idea that has not recently failed. These conditions are lax to increase the probability of creative ideas emerging from the discovery cycle and to provide enough ideas as sufficient "grist" for the design cycle. The specificity of initial problem conceptions is usually very low, since the job of the discovery cycle is to generate problems. The process of taking this initial problem conception and elaborating, formulating, and solving it to produce a plan or instructional activity takes place in the problem formulation/solution stage of planning.

Problem Formulation and Solution

The second stage in the model of teacher planning involves problem formulation and solution. The basic assumption made in this stage is that problem formulation is an essential element in problem solving and that the two processes proceed hand-in-hand. The interweaving of these two processes is necessary because of the openness of the planning problem situation. Before a problem may be solved, it must first be discovered and then formulated into a manageable state.

Problem formulation and solution activities in teacher planning are portrayed as a design process. There are obvious parallels between the situations confronting teachers and those confronting designers. In

both cases, no problem specification is given or agreed upon, no formal language with precise solution operations are available, and the goals to be achieved and the restrictions on the problem are open to interpretation. Further similarities are suggested by the research findings indicating the absence of planned alternatives and the peripheral nature of specific, well defined goals and objectives in teacher planning.

Based on these apparent similarities, the problem formulation/solving stage of planning is modeled after design processes that have proven to be characteristic of musical composition (Bahle), chess thinking (deGroot), and architectural design (Baer, Eastman). In all three of these situations, problem solving has been characterized as a process of alternation between phases of problem development (elaboration, construction) and phases of problem reformulation (adaptation, transformation). In other words, findings suggest a general design process made up of continual goal development involving a cycling between solution anticipations and the results of attempts at solving subproblems. The existence of these processes in three such apparently disparate endeavors as playing chess, writing a song, and designing a building adds credibility to the notion of a "principle of creative form-making" (Bahle, 1939).

The primary mechanism of problem formulation and solution is referred to as the design cycle. Here problem solving is portrayed as a design process involving progressive elaboration of plans or activities over time. This process is illustrated in Figure 5.

The dominant feature of the design cycle is its phase structure. The progressive development and solution of the planning problem takes place as it cycles through phases of elaboration, investigation and adaptation. These phases are a synthesis of the "elaborative move," and "transition"

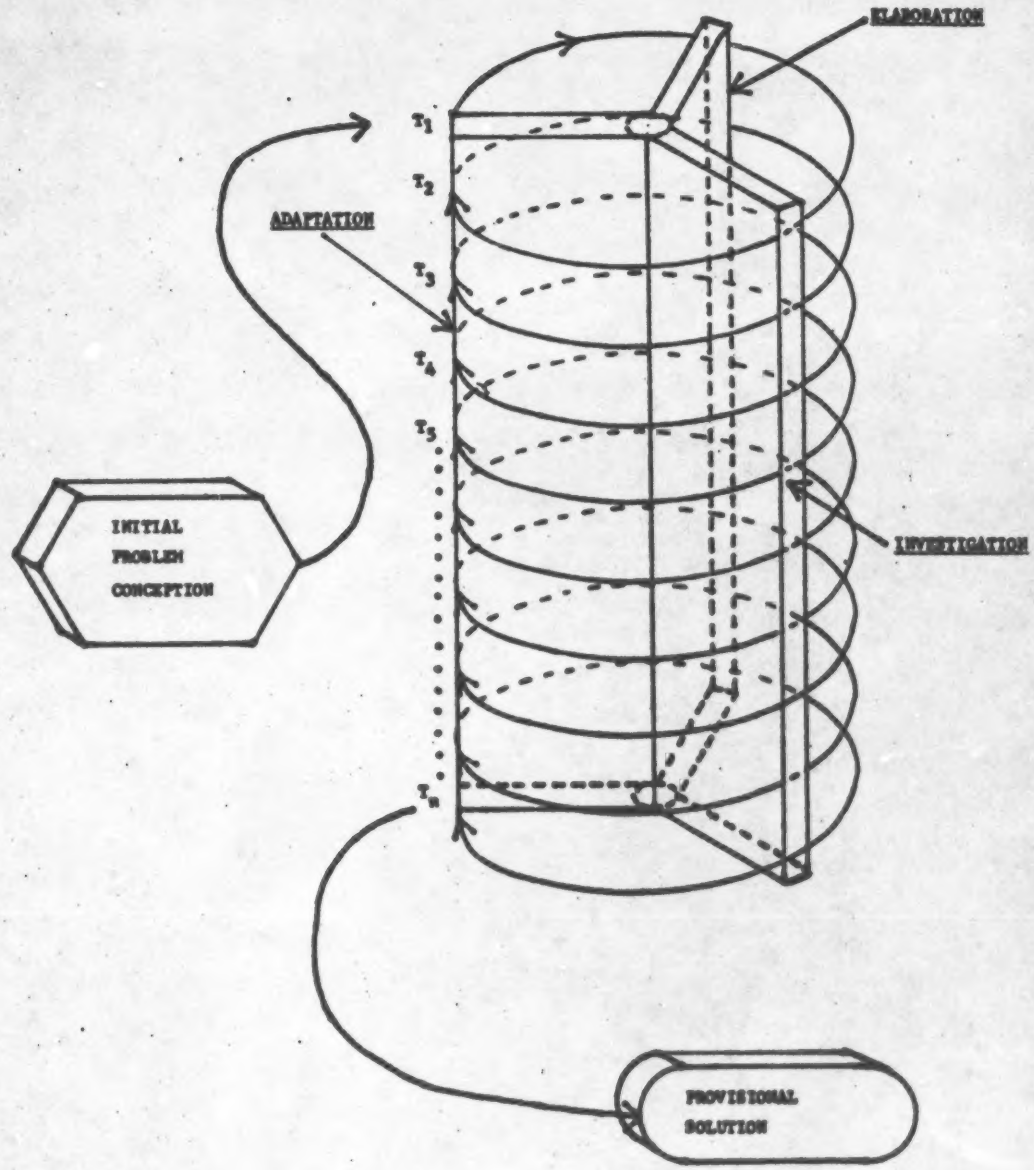

Figure 5: The problem formulation and solution (design) stage of teacher planning.

phases of deGroot (1965) and Baer's (1976) problem formulation processes of "construction" and "adaptation." As a problem progresses through the three phases of design, two major aspects of the thought process are involved. Elaboration and investigation draw on the planner's repertoire of problem solving methods (knowledge and experience), and adaptation is based upon the planner's total problem conception.

There are two other important general features of the design cycle. First, the process is serial in nature and only one problem is elaborated at a time. Elaboration, investigation, and adaptation continue until the problem is "solved" or until it is rejected as unworkable. The second feature is that the process happens over time. The length of the cycle can vary, however. At its longest, the cycle may continue across several levels of planning. For instance, a unit activity might be progressively planned over a period of several weeks. At the other extreme, the cycle may last only minutes if an initial problem conception requires only minor elaboration to become workable or if it is quickly rejected after several cycles because of the discovery of a major obstacle to its potential workability.

The elaboration phase is the construction phase of the design cycle. Its function is to elaborate and further complete the total problem conception by supplying detail to sub-problems or to the total problem conception.

Elaboration takes place through two methods. The first is the recombination of thought elements or routines that already exist in memory. In Selz's terminology, this method involves the "reproductive actualization of means." It is proposed that for the experienced teacher, this is the primary method of problem elaboration. The repertoire of means-ends

relationships built up through experience is heavily relied upon for several reasons. Means-ends relationships accrued through experience likely carry with them some record of success or failure. Thus, the planner has more reason to predict its success as a solution. Also, elements stored in memory are usually readily available. This reduces the time and energy consumed by an elaboration since it eliminates the search and effort involved in locating new means.

The second method of elaboration proposed by the model is the addition of new elements or "means" not yet a part of the teacher's repertoire of experience. This is referred to by Selz as "means abstraction." Here the problem requires that new means be found to produce new results. This method is subsidiary to the first method of elaboration primarily because of the additional "cost" involved. It should nearly always be more efficient to actualize a means reproductively than to become involved in a search for a new one. An additional source of new means lying outside of the planner is the materials available for instruction. As described in the problem finding stage, materials can serve as an external source of ideas. This may be especially true in the design cycle if the initial problem conception originated primarily from materials in the discovery cycle.

Elaboration is carried out on either the total problem conception or on specific subproblems. In teacher planning, the latter situation is more likely since the use of subproblems facilitates a more orderly and efficient approach to the complex problems involved in teaching. For example, the primary objects of planning for the teacher in this study were activities. The most obvious subproblems of planning for activities

are the seven features of activities described above. When planning new activities, elaboration could be directed at detailing the location of the activity, its structure and sequence, the duration, the participants, acceptable student behaviors, instructional moves, and the content and materials.

The product of the elaboration phase is a subproblem solution or the completion of a facet of the total problem conception. These elaborations are, nevertheless, somewhat provisional since their feasibility or workability has not yet been examined. This is the purpose of the next phase in the discovery cycle--investigation.

Following elaboration, the problem moves to the investigation phase of the design cycle. Here the elaborations are submitted to some form of analysis to determine the success or failure of the solving attempts. Investigation has two primary functions. First, it provides information about the workability of the elaboration and its success or failure as a subproblem solution. Second, it provides new knowledge and information about the planning problem based on the results of investigation. This is especially true of failures. Here the analysis of the solution provides information about aspects of the problem not part of the total problem conception and not anticpated in the previous elaboration. This information may serve as a basis for a problem transformation in the subsequent adaptation phase.

Investigation relies primarily on two thought components. Like the elaboration phase, this phase draws upon knowledge and methods build up through experience. Successful and efficient investigation methods are developed to facilitate this "feasibility testing" in the same way that solving methods are developed in the elaboration phase. The total problem

conception is the second component of thought used in the investigation phase. Whereas knowledge and experience provide the methods for investigation, the total problem conception provides the criteria. The success or failure of an elaboration (or subproblem solution) is determined by its success in meeting the expectations established by the anticipations that accompanied the subproblem. Thus, the anticipation provides not only the motivation to carry out the elaboration, but also supplies the criteria against which to measure its success. The duration and thoroughness of the investigation phase may vary immensely. On the one hand, the analysis may proceed in an almost totally automatic or routine manner. Such a process may be directed by a component of an executive planning routine and might include a method like running down a mental checklist. On the other hand, the analysis may be more conscious and deliberative. Here the process becomes much more of an "investigation" -- exploring elements of the solution in more detail. "Trying out" is one such method that was characteristic of the planning of the teacher in this study.

"Trying out" is a general solving method suggested by deGroot (1965) In this model, it refers to a mental investigation method that supplies information about the success or failure of an elaboration by running it through a projection (visualization) of the situation for which it is planned. Trying out differs from trial-and-error testing in that it is goal oriented, with a specific direction in mind (i.e., testing a specific elaboration.)

Trying out as evidence by the teacher in this study mainly involved checking out an elaboration by thinking through and anticipating its outcomes in the classroom. This involved a kind of projection of the plan or the activity into her present class and teaching situation. This

process was suggested by her frequent use of statements such as, "That will never go," "That might work," or, "I can see right now that that will never work." As a general investigative method trying out seemed to increase greatly the efficiency of planning. Rather than having to test every elaboration in the classroom or wait until planning had been completed, trying out allowed a fairly accurate testing of a solution by placing it in a "projection" of the future that was based on knowledge and experience.

Whether through "trying out" or some other method, the results of the investigation phase provide information about the success or failure of the previous elaboration and new knowledge about the total planning problem. Both of these pieces of information contribute to and influence the problem transformation in the subsequent adaptation phase of the design cycle.

Adaptation is the phase of the design process that completes the problem solving cycle. It is in effect both the beginning and the end of each cycle. This is because the adaptation phase is focused on the development and completion of the "total problem conception." The total problem conception, like teaching goal conceptions discussed earlier, is modeled after deGroot's "total goal conception." The total problem conception refers to the problem solver's anticipatory conception of the solution to the problem or the "goal-as-attained." It begins as a vague and general anticipation, and as a result of elaboration, it is gradually specialized, differentiated, transformed, and completed.

The total problem conception arises from the initial problem conception which is the product of the problem finding process. At the be-

ginning of the design process, they are essentially the same. Soon after being taken on as a problem, however, the initial problem conception acquires a more complete character. In addition to being an abstract idea with potential for elaboration, it becomes a full-fledged problem with all the accompanying features. These include not only the conception of the main planning problem, but also anticipations about its difficulty or solvability, solution methods, notions of intuitive or emotional preference, and any motivational dispositions.

Once the total problem conception is initially formulated, it becomes the source of specific work problems or subproblems to be elaborated (solved). The results of this elaboration (either positive or negative) are fed back to the total problem conception by the investigation phase. These results thus effect the total problem conception by either completing a portion of it or requiring a new view of the problem because of unanticipated outcomes. At any rate, the total problem conception is always changed as a result of an elaboration. It never looks the same after an elaboration (and investigation) as it did before. Hence, in Figure 5 the the total problem conception is changed and is different each time the cycle is completed (T_1, T_2, T_3, etc.).

Whereas the previous two design phases are basically phases of elaboration, adaptation is a phase of integration and transformation. The main purpose of adaptation is to formulate and develop the total problem conception which, in turn, directs further elaboration (problem solution). Thus, adaptation involves two processes: the integration of what has preceeded and the preparation for what follows.

The integration of what has preceeded (elaboration and investigation) nearly always involves a return to a more general problem. This

occurs because in most planning problems elaborations are carried out on only a part of the main problem (e.g., a subproblem). To provide information to the main problem the results of the subproblem must be analyzed in the larger context. This integration of the part with the whole allows the assessment of whether the previous elaboration has contributed to the completion of the main problem. Integration may also promote differentiation and specialization as subproblem elaborations make various aspects of the problem more concrete and detailed. This return to a more general problem allows abstraction. Here new possibilities may stand out against the concrete form of the problem thus far; the results of elaboration may suggest new properties or relationships in the problem.

The second process of adaptation involves preparation for further elaboration. As mentioned above, the adaptation phase always involves a problem transformation. This may be an enrichment and completion of the main problem or involve a more radical structural transformation. Whatever the form, this transformation is the basis for further elaboration, which requires a freshly set, specialized subgoal.

The nature of the total problem conception is such that it is rarely rejected in its entirety. Rather, it is transformed and modified until a workable solution is achieved. This lack of "scrapped" planning problems is primarily due to experience. In the discussion of the problem finding process, teaching goal conceptions and knowledge and experience were portrayed as "filters" to the problem discovery process. Thus, ideas reaching the form of initial problem conceptions have fairly good experience-based potential. Once the idea is formulated as a planning problem, it is unlikely that so many unforseen results will take place to render the problem totally unworkable. A

problem may be radically transformed, but continuity will exist in many aspects of the total problem conception.

A problem is "solved" when it achieves the level of anticipation or aspiration that makes up the total problem conception. Since problem formulation takes place hand-in-hand with problem solution, the final problem formulation is not achieved until the final solution. Once these two processes finally converge, the design process is completed. The fact that in most teaching situations the designer is also the implementer may mean that the end-product of the design cycle is only a provisionally acceptable solution which will only become final as a result of success in the classroom. It is in the third stage of this planning model that this implementation and evaluation take place.

Implementation, Evaluation, and Routinization

The focus of this model has been preactive planning for instruction. The discussion thus far has been concerned with two central aspects of this process--problem finding and the design cycle. The final stage of the model is not preactive planning, as such, but it does provide the final link in the instructional planning process. There are two other reasons for a discussion of this stage. It reflects the provisional nature of the results of the design process by proposing an actual "trying out" of the solution followed by an evaluation. Also, the results of this process feed back to and build up the repertoire of knowledge and experience which, in turn, becomes an important component in subsequent planning. The interaction among implementation, evaluation, and routinization which makes up the final stage of teacher planning is illustrated in Figure 6.

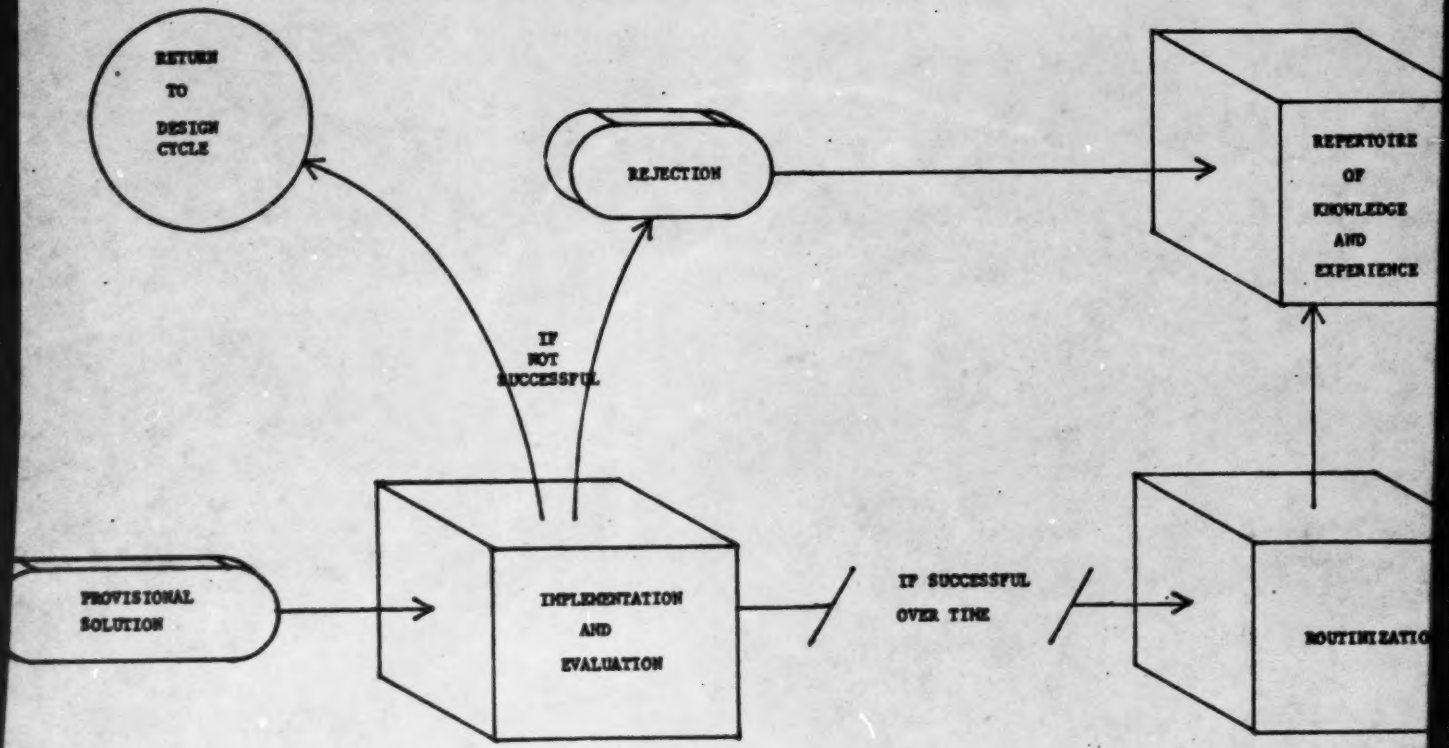

Figure 6: The implementation, evaluation, and routinization stage of teacher planning.

The third stage of planning portrayed here holds mainly for planning for activities. It is hypothesized that the other major product of planning, plans themselves, do not generally follow this sequence. The primary reason for this is that the evaluation of plans by the teacher in this study was rarely carried out on the basis of how they worked out. Rather, their success or failure was determined on a structural basis beforehand; that is, on the basis of characteristics such as comprehensiveness, balance, variety, and so forth (see Table 1). Since plans are merely a framework to guide future action (instruction) and this teacher's instruction was focused on activities, there was little concern for the quality of the plans, per se. The reason for this was that quality was usually fairly well assured through experience so that by the time of this study, plans that conformed to certain structural criteria nearly always served their purpose. In other words, planning had become so routinized that its effectiveness was rarely consciously scrutinized. The exception to this was the weekly schedule established during term planning. This was, in fact, the only plan actually implemented in the classroom. For these reasons, the third stage of planning in the model will be discussed within the framework of planning for activities. The following description of implementation, evaluation, and routinization will be brief and schematic and rely heavily on examples from this study.

The final goal of instructional planning is the actual implementation of an activity in the classroom. All planning is aimed at making this moment as successful as possible for the students and the teacher. Even though activities have been submitted to many cycles of elaboration and mental "trying out," their success is not guaranteed until they have been tried out in the classroom with the present group of students. For this

reason, the solutions produced by the design cycle are only provisional. Regardless of experience, implementation often yields unexpected and surprising outcomes.

The types of outcomes that the teacher in this study attended to most in the classroom typically focused on student involvement, interest, and enthusiasm rather than on learning outcomes. Similar findings have been reported by Jackson (1968) and Clark and Peterson (1976). At first glance, this finding seems alarming; however, Jackson offers the following explanation:

> The problem turns, it would seem, on the distinction between the teacher's primary concern and his ultimate concern, on the thoughts and practices dominating his immediate actions with students, as contrasted with his hopes and expectations concerning the long-term achievement of individuals within his class. Teachers, particularly in the lower grades, seem to be more activity-oriented than learning-oriented. That is, they commonly decide on a set of activities which they believe will have a desirable outcome and then focus their energies on achieving and maintaining student involvement in those activities. Learning is important, to be sure; but when the teacher is actually interacting with his students, it is at the periphery of his attention, rather than at the focus of his vision (1968, p.162).

During or subsequent to implementation, activities are evaluated in some manner. In the classroom observed in this study, activities were not accepted, rejected, or modified based on one day's results. They were typically given several days and sometimes several weeks before a final judgment about their effectiveness was made. The teacher explained this by saying that children of this age need several days to adjust and adapt to changes or new situations. Early problems with activities (especially when the focus is on involvement, interest, and enthusiasm) usually ironed themselves out as the students became familiar with the

activities. The teacher took this same attitude with new weekly schedules, and modifications were made only at the end of a two or three week adjustment period at the beginning of the term.

Changes in unworkable activities were usually along these lines: if an activity needed slight revision but was otherwise successful, modifications were made. This might only amount to a brief review via the design process focusing on the deficient element or feature. (In the model this is reflected by a looping back to the design cycle where the problem is formulated, elaborated, and mentally investigated until a feasible solution is reached.) This revision was then fed back to the next activity session.

The other alternative for unsuccessful activities is rejection. Here the whole activity is thrown out as unworkable. This is usually after the deficiencies have been unsuccessfully redesigned or when the difficulties affect features that are not modifiable. For the teacher in this study, this was a rare occurrence. This was probably due to the amount of experience on which planning was based and the efficiency and effectiveness of the design cycle in weeding out problems.

Many activities that are successful in the classroom are further changed by the process of routinization. More accurately, they go through a process of being "unchanged"' that is, their elements and features are established to the point of becoming routine. As mentioned earlier, routinization functioned to lessen the planning burden on the teacher by reducing the number of activities or activity features that needed to be planned on a regular basis. Because of this, most of

her planning during winter and spring terms was devoted to social studies, science, and math unit planning--activities for which she had chosen to spend more time, and to activities such as field trips and cooking for which routinization was not feasible.

In the planning model, routines established in the classroom become part of the teacher's repertoire of knowledge and experience. This illustrates an important link between current teaching and future planning. As activities take on a routine character in the classroom, these established patterns of teaching may also take on a routine character in memory. Chase and Simon (1973) in an article entitled "The Mind's Eye in Chess" suggest that the bulk of the chessmaster's experience is represented by tens of thousands of visual patterns of chess moves stored in memory. As a "new" configuration is encountered on the board, it calls up the same pattern from memory along with the accompanying solution methods and strategies. It may be that experience in teaching is in a similar manner constructed of a repertoire of routines in memory called up (immediately abstracted) by specific planning and teaching situations. These routines may then be implemented wholly or in part as solutions (elaborations) for particular planning problems. Thus, routinization of activities or strategies serves not only a current purpose of reducing the planning load, but also provides constructs in memory to simplify and improve future planning.

Discussion

In general, the descriptive findings of this study seem consistent with previous studies of teacher planning. Zahorik (1975) found that the kind of planning decision most frequently reported concerned pupil

activities and that decisions about content were most frequently reported first. Similar findings were reported by Peterson, Marx, and Clark (1977) in a study done at Stanford. They observed teachers spending the largest proportion of their planning time deliberating about content (subject matter) followed by decisions concerning instructional processes (strategies and activities). Like Zahorik, they found decisions regarding objectives conspicuously absent. While Zahorik found half of his teachers reporting decisions about objectives, Peterson, Marx, and Clark observed that only the smallest proportion of their teachers' time was spent on objectives (.04%) even though a suggested list of objectives had been provided to them beforehand.

Findings of the present study seem consistent with these results. The most prominent and frequent planning concern of the teacher in this study was activities. The distinctions made among activities, content (subject matter), and materials made by Zahorik and by Peterson, et al. were not, however, apparent in this teacher's planning. Content and materials were subsumed under activities as features that helped define the activity. Thus, activities did not exist apart from some subject matter. Part of this difference, may, however, be definitional. Both Zahorik and Peterson, et al. defined activities in terms of instructional process or strategy. This definition is much closer to the teacher instructional move feature mentioned earlier. In other words, the notion of an activity used in the present study is much broader than those used previously and includes features that have previously been treated as independent decisions. It may be that the notion of instructional activity developed in this study can provide a more useful framework for relating these various planning judgments and subproblems.

The notion of routinization discussed above may provide an explanation for the additional findings in these two studies of the predominance of content as a focus of planning. Even in a highly routinized classroom as found in this study, content and materials was the feature of activities most frequently left "open" and requiring planning at the weekly level. Content and materials could be viewed as the most frequent subproblem that this teacher had to deal with on a regular basis. This decision should become even more frequent for teachers with less routinized teaching. Except for the most highly routinized activities, decisions about content and materials should always be present.

Like Zahorik's and the Stanford study, behavioral objectives were not a central part of teacher planning in this study. Objectives were confronted primarily in the form of district objectives for each subject matter area and were only used as a guide or framework for deciding on activities. There was little evidence in this teacher's planning to support the rational choice model of planning. Based on these findings, planning was portrayed as a purposeful activity guided by teaching goal conceptions and the specific problem conceptions, and no provision was made for planning using behavioral objectives or prior stated instructional goals.

The findings of this study are also consistent with those of Morine (1976). She found that most of the plans submitted by the teachers in her study were moderately specific outlines listing possible examples or questions that the teacher might use in the lesson. An outline form was also popular in the planning of the teacher in this study:

however, at no level in her planning were specific examples or possible questions written down. This agrees with the follow-up notes or comments by approximately two-thirds of Morine's teachers stating that their written plans submitted for the two experimental lessons were much more detailed than usual and that most of their regular planning was done in their heads.

The lack of specificity about instructional strategy in the "thinking aloud" while planning of the teacher in this study and the recurrent patterns in her teaching were major factors leading to the proposal of the existence of instructional routines. It appeared that general "strategies" were routine while specific examples and questions were partially routine and partially composed in response to the situation at hand. In this manner, the teacher could have the security of a general format to follow, yet be flexible to the uniqueness of each teaching encounter.

Morine also found that when goals were stated by teachers, they were non-behavioral goals. The teachers not only selected from the goals provided to them, but also tended to restate and develop original goals. As mentioned above, this non-behavioral orientation of goals and the tendency to modify goals better to suit one's purpose was also characteristic of planning in this study.

Attention to evaluation procedures and to pupil background characteristics was almost entirely absent from Morine's teachers' plans. This lack of visible attention to evaluation procedures was also apparent in this study and seemed to be due to the built-in nature of the teacher's evaluation procedures. Written work was routinely evaluated and marked throughout the day, and student progress in tasks not regularly producing written products (e.g., reading) was monitored through regularly

scheduled contact with all the students. Because of this, special evaluation features were rarely included in activities and a look at the teacher's plans would reveal an apparent absence of a concern for evaluation.

Attention to pupil background characteristics was also not visible in this teacher's plans themselves, but they were readily apparent in her planning process. Pupil characteristics were an important source of information at all levels of her planning. In terms of the process model, pupil characteristics are an important part of knowledge and experience and play a role in both problem finding and the design process. Although pupil characteristics are used to guide the process of planning, they are not necessarily apparent in the product.

Pupil characteristics and other factors influencing planning might be more visible if plans included several well developed alternatives for action. Then the choice among alternatives might be based on the presence or absence of certain aspects of the environment. However, in both Morine's and the present study, alternatives were rarely, if ever, mentioned in the final plan. Although only a small proportion of Morine's teachers listed alternatives in their plans, most of the teachers later indicated during an interview that they had thought of alternatives during their planning. Since only a few mentioned alternative activities, it is assumed that most of the alternatives were "variations on a theme."

This lack of well developed alternatives as a product of planning influenced the form of the process model proposed earlier. A major feature of the design process was that only one planning problem was pursued at a time and only one solution was produced by the process. Alternatives might be considered as subproblem elaborations, but they

would either be eventually rejected or incorporated into the total problem conception. Morine's finding that materials and cognitive considerations ("content") were reported most frequently suggests that these two aspects are essential subproblems taken up during the design process. Had Morine's teachers been following a rational choice model of planning, one would have expected a much higher frequency of alternatives reported in the plans. Although the focus of Morine's study was not process description, it can be inferred from the planning products and the teachers' responses that few, if any, of the teachers were following the rational choice planning model.

To date, no studies of the teacher planning process itself have been conducted to which the results of this study may be compared. In the three studies just discussed, process can only be inferred from products of planning or time spent in various planning endeavors. Studies of planning outside of education have had little more to offer. Case studies of national or city planning have revealed little more than a lack of evidence to support the rational choice model. Based on this, alternative theories have been proposed but not empirically tested. Individual planning itself has only been systematically investigated in the area of architectural planning, and then only recently. The similarities between this process and teacher planning were briefly mentioned above.

It is obvious from this discussion that research on teacher planning is in its infancy. Research on the information processing involved in teacher planning has been initiated only within the last few years. There is a great need for further research in this area to test the results of this investigation and the models that have been proposed.

The model portrayed in Figure 7 may be one way to illustrate and coordinate for further research the components of the planning process that have been described or proposed in this study.

The cube representing the research "space" was composed by combining three dimensions of the planning process represented in this study: the five levels of planning represented in the structural model, the three stages of the process model, and the cognitive components involved in planning represented by Simon's three phases of decision making -- intelligence, design, and choice. Intelligence refers to those processes for scanning the environment to see what matters require decision. Here, it includes the perceptual and search processes of planning. Design includes the memory and the generation, combination, and manipulation processes. Choice includes processes for choosing among courses of action such as judgment and decision making.

It is feasible that future planning studies would choose a cell or a slice of the model to investigate. For instance, one might investigate choice involved in problem finding at the yearly level of planning or one might study problem finding in general across all five levels. One might also, for example, choose to study unit planning in general or select a certain planning stage or cognitive component to examine. As studies are completed, the model would provide a framework for coordinating the results and for indicating processes not yet investigated. It is also likely that future studies would modify the research space by adding or deleting aspects of each facet as the characteristics of the planning of many teachers are described.

To conclude, it is felt that the secondary goal of this study of formulating question for further research through the generation of

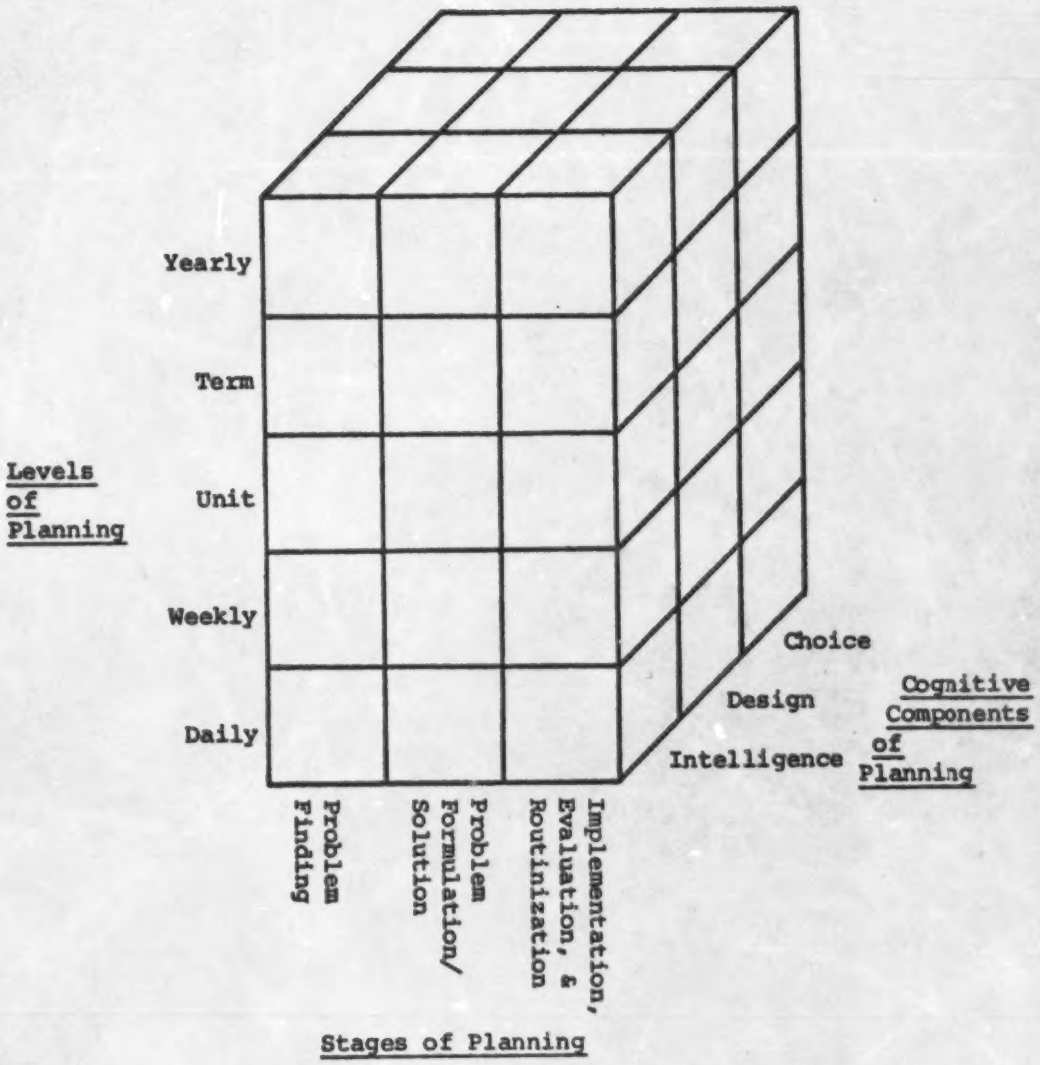

Figure 7: A model for Planning research

hypotheses and models has been achieved to an unexpected degree. The complex tapestry of planning and teaching that this study has only partially represented has revealed many new ideas and questions that need to be followed up by further study. Also, notions of teaching as a fairly simple, straightforward enterprise have been further dispelled by revealing the intricacies of the teaching environment and the variety of cognitive skills brought to bear by the experienced practitioner. This provides further support for the claim that research on teaching must continue to examine the "wisdom of the practitioner" as it is developed and functions during teaching in real classrooms.

Notes:

1. This saying has been attributed to Dr. Perry Lanier and has become the informal motto of the Institute for Research on Teaching at Michigan State University.

2. See Shulman and Elstein (1975) for a description and discussion of "process tracing" and other decision modeling methods. See McCall and Simmons (1969) for a comprehensive introduction to participant observation.

REFERENCES

Baer, A.E. A cognitive model of problem formation in design. Carnegie-Mellon University, Institute of Physical Planning, Research Report No. 62, 1976.

Bahle, J. Zur psychologie des musikalischen gestaltens, eine untersuchung über das kimponieven auf experimenteller und historischer grundlage. Archiv für die gestamte Psychologie, 1930, 74, 289-390.

Bahle, J. Der musikalische schaffungsprozess. Psychologie der schöpferischer erlebniss und antriebformen. Leipzig: Hirzel, 1936.

Barker, R.G. On the nature of the environment. Journal of Social Issues, 1963, 19, 17-38.

Becker, H.S. Problems of inference and proof in participant observation. American Sociological Review, 1958, 28, 652-660.

Chase, W.G. and Simon, H.A. The mind's eye in chess. In Chase, W.G. (ed.), Visual information processing. New York: John Wiley and Sons, 1973.

Clark, C.M. and Peterson, P.L. Teacher stimulated recall of interactive decisions. Paper presented at the Annual Meeting of the American Educational Research Association. San Francisco, 1976.

de Groot, A.D. Thought and choice in chess. The Hague: Mouton, 1965.

Doyle, W. Learning the classroom environment: An ecological analysis of induction into teaching. Paper presented at the Annual Meeting of the American Educational Research Association. New York, April, 1977. (a)

Doyle, W. The uses of nonverbal behaviors: Toward an ecological model of classrooms. Merrill-Palmer Quarterly, July, 1977. (b)

Eastman, C.M. On the analysis of intuitive design processes. In Moore, G. (ed), Emerging methods in environmental design and planning. Cambridge: MIT Press, 1970. (a)

Eastman, C.M. Problem solving strategies in design. Carnegie-Mellon University, School of Urban and Public Affairs, Reprint No. 23, 1970. (b)

Eisner, E.W. Educational objectives: Help or hinderance. School Review, 1967, 75, 250-266.

Institute for Research on Teaching. Proceedings of the research on teaching mathematics conference. Conference Series No. 3. East Lansing: Institute for Research on Teaching, Michigan State University, in press.

Jackson, P.W. The way teaching is. Washington: National Education Association, 1965.

Jackson, P.W. Life in classrooms. New York: Holt, Rinehart, and Winston, 1968.

Jones, J. The state of the art in design methods. In Moore, G. (ed), Emerging methods in environmental design and planning. Cambridge: MIT Press, 1970.

Joyce, B.R. and Harootunian, B. Teaching as problem solving. Journal of Teacher Education, 1964, 15, 420-427.

Gagne, R.M. The conditions of learning, (2nd ed). New York: Holt, Rinehart, and Winston, 1970.

Getzels, J.W. and Csickszentmihalyi, M. The creative vision: A longitudinal study of problem finding in art. New York: John Wiley and Sons, 1976.

Glaser, R. Implications of training research for education. In Hilgard, E.R. (ed), Theories of learning and instruction. The 63rd Yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press, 1964.

Goodlad, J., Klein, M.F. and Associates. Behind the classroom door. Worthington, Ohio: Charles A. Jones Publishing Co., 1974.

Gump, P.V. The classroom behavior setting: Its nature and relation to student behavior. Final Report, Contract No. OE-4-10-107, U.S. Bureau of Research, H.E.W., 1967.

Gump, P.V. Intra-setting analysis: The third grade classroom as a special but instructive case. In Willems, E.P. andRaush, H.L. (eds), Naturalistic viewpoints in psychological research. New York: Holt, Rinehart, and Winston, 1969.

Kounin, J.S. Discipline and group management in the classroom. New York: Holt, Rinehart, and Winston, 1970.

Lanier, J.E. and Shulman, L.S. Technical proposal, Institute for Research on Teaching. Michigan State University, 1975.

MacDonald, J.B. Myths about instruction. Educational Leadership, 1965, 22, 571-576, 609-617.

MacDonald, J.B., Wolfson, B.J., and Zaret, E. Reschooling society: A conceptual model. Washington, D.C.: Association for Supervision and Curriculum Development, 1973.

McCall, G.J. and Simmons, J.L. Issues in participant observation. Reading, Mass.: Addison-Wesley Publishing Co., 1969.

Morine, G. Special study C. A study of teacher planning (BTES Technical Report 76-3-1). San Francisco: Far West Laboratory for Educational Research and Development, 1976.

Peterson, P.L., Marx, R.W. and Clark, C.M. Teacher planning, teacher behavior, and student achievement. Unpublished manuscript, 1977.

Popham, W.J. and Baker, E.L. Systematic instruction. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1970.

Selz, O. Zur psychologie des produktiven denkens und des irrtums. Bonn: Friedrich Cohen, 1922.

Selz, O. Die gesetze de produktiven und reproduktiven geistestätigkeit. Kurzgefasste darstellung. Bonn: Fredrich Cohen, 1924.

Shavelson, R.J. What is the basic teaching skill? Journal of Teacher Education, 1973, 24, 144-151.

Shulman, L.S. and Elstein, A.S. Studies of problem solving, judgment, and decision making. In Karlinger, F.N. (ed), Review of Research in Education. Vol. 3. Itaska, Illinois: F.E. Peacock and Co., 1975.

Simon, H.A. Models of man. New York: John Wiley and Sons, Inc., 1957.

Snow, R.E. Theory construction for research on teaching. In Travers, R.M.W. (ed), Second handbook of research on teaching. Chicago: Rand McNally, 1973.

Smith, L.M. and Geoffrey, W. The complexities of an urban classroom. New York: Holt, Rinehart, and Winston, 1968.

Taba, H. Curriculum development, theory and practice. New York: Harcourt, Brace and World, Inc. 1962.

Taylor, Philip, H. How teachers plan their courses. New York: NFER Publishing Co., Ltd., 1970.

Tyler, R.W. Basic principles of curriculum and instruction. Chicago: University of Chicago Press, 1950.

Zahorik, J.A. The effect of planning on teaching. Elementary School Journal, 1970, 71, 143-151.

Zahorik, J.A. Teachers' planning models. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C., April, 1975.